FOREST PEST CONDITIONS IN CALIFORNIA-1976

PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL was founded in 1951. Its membership is open to public and private forest managers, foresters, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, insects, and diseases. Its objective is to establish, maintain, and improve communication among individuals - - managers, administrators, and researchers -- who are concerned with these problems. This objective is accomplished by four actions:

1. Coordination of detection reporting and compilation of pest damage information.

2. Evaluation of pest conditions.

3. Pest control recommendations made to forest managing agencies and owners.

4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The State Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

THIS REPORT, FOREST PEST CONDITIONS IN CALIFORNIA - 1976, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by the Statewide Cooperative Forest Pest Detection Survey; in 1976, 304 reports were received: 180 for insect pests, 104 for diseases, and 20 for animal pests.

The report was prepared by the Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Department of Forestry.

COVER PHOTO. The Douglas-fir tussock moth enjoys political, social, economic, and biological notoriety in California and throughout the West, and has been accorded Big Bug status by the USDA Combined Forest Pest Research and Development Program. In California the Program is being conducted with close cooperation by the Pacific Southwest Forest and Range Experiment Station and Region Five of the Forest Service, and by the University of California at Berkeley.

Sacramento January 1977

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HIGHLIGHTS OF PEST CONDITIONS - 1976

STATUS OF INSECT PESTS. In general defoliator activity decreased or remained static at a low level in 1976. Two exceptions were the lodgepole needle miner and the Jeffrey pine needle miner; population densities of these two insects continued at outbreak levels through late summer.

A small, established infestation of the gypsy moth -- a destructive pest of fruit, shade, and forest trees in the East -- was detected near San Jose, Santa Clara County.

Some spectacular occurrences of tree killing by bark beetles were reported. The most noticeable occurred late in 1976, and were associated with western pine beetle activity.

[Note: As this report goes to press, the prospect for widespread tree killing by bark beetles grows increasingly strong for 1977. Moisture stress, brought on by the 18-month-long drought in central and northern California, has already triggered sizeable increases in the number of bark beetle-killed trees. Furthermore, the forecast is bleak for sufficient rain and snowfall by summer 1977 to relieve that stress. The Insect Committee of the California Forest Pest Control Action Council urges all forest land managers to be aware of the increased level and probable rising trend in tree killing by bark beetles, and to increase their salvage efforts accordingly.]

STATUS OF DISEASES. Diseases of forest nurseries continued to be a major concern -- Rhizoctonia, Fusarium, Pythium, and Botrytis were active in nurseries throughout the State. The incidence of Dermea canker increased, and the disease was reported in the northern Sierra Nevada.

Lophodermella needle-cast of sugar pine was reported widely throughout the northern part of California. Ozone injury to ponderosa and Jeffrey pines was common in parts of the southern Sierra Nevada downwind from major urban centers.

STATUS OF ANIMAL PESTS. Pocket gophers, porcupine, and deer continued to be the three mammal species causing the most significant damage to commercial conifer forests.

STATUS AND CONTROL OF INSECT PESTS

DOUGLAS-FIR TUSSOCK MOTH, Orgyia pseudotsugata. Douglas-fir tussock moth populations remained at endemic levels since the 1970-73 outbreak. Cooperative efforts, involving the California Region and the Pacific Southwest Forest and Range Experiment Station of the Forest Service, and the University of California, continued under the auspices of the expanded USDA Douglas-fir Tussock Moth Research and Development Program. These efforts included the development of a sampling system for low to moderate population levels, the development of a predictive monitoring system using synthetic pheromone traps, and the characterization of sites and stands with a history of tussock moth outbreak activity.

Catches of male moths in pheromone detection traps on the Modoc National Forest, the Stanislaus National Forest, and the Eldorado National Forest were approximately twice as great as in 1975; however, more work was needed before valid conclusions about population levels and trends could be drawn from these data. As in 1975, moths were caught on all of the trap sites.

JEFFREY PINE NEEDLE MINER, Coleotechnites sp. nr. milleri. The Jeffrey pine needle miner continued to infest some 3275 acres of trees on the San Bernardino National Forest. The area of infestation increased by approximately five times over 1975.

An evaluation of the needle miner is in progress. It will include updated maps of the 1976 infestation and a preliminary estimate of growth impact. Chemical insecticides for control of the Jeffrey pine needle miner in ornamental trees are being evaluated by the Forest Service and the University of California at Riverside, with a tentative field experiment planned for the spring of 1977.

GYPSY MOTH, Lymantria dispar. An established infestation of the moth was discovered in Willow Glen (Santa Clara County), a suburb south of San Jose. This discovery marked the first time that gypsy moth had been found established in the western United States.

In Willow Glen, a single male moth was caught in a detection trap in 1975. In 1976 three additional separate trap catches were made; subsequently, an intensive search for over-wintering egg masses was initiated. To date, some 250 viable egg masses have been found on seven adjoining lots. The presence of cast skins, pupal cases, and old egg masses -- plus verbal reports from local residents -- gave rise to speculation that the infestation may have become established as early as 1972, and has been intensifying and spreading since then.

The California Department of Food and Agriculture began the necessary steps to decide the most appropriate actions to take.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae. Populations of the Douglas-fir beetle remained at a low level throughout 1976; as in 1975, no outbreaks were reported. The beetle was implicated, however, as one of several important biotic agents contributing to the greater-than-normal mortality of Douglas-fir on the Salmon River District, Klamath National Forest (see SURVEYS AND EVALUATIONS, page 6).

FIR FLATHEADED BORER, Melanophila drummondi. Quantitative data gathered as a part of the biological evaluation of accelerated Douglas-fir mortality on the Klamath National Forest supported what was reported in 1975 about the increasingly serious mortality of Douglas-fir in northwestern California; the fir flatheaded borer was present in a large portion of the dead and dying trees (see SURVEYS AND EVALUATIONS). Salvage logging to recover dead and dying Douglas-fir was the only action recommended to date.

WESTERN PINE BEETLE, Dendroctonus brevicomis. Through mid-summer tree killing by western pine beetles was judged to be near normal. By late fall, however, the severe drought of the previous 18 months in northern California began to manifest itself, and the occurrence of fading ponderosa pine increased markedly. The increase was most noticeable in the lower elevation pine type of the Sierra Nevada, and on the edges of the timber type, such as the upper elevation limit of the species or on low-site chaparral fringes. Pronounced increases were reported at Camp Nelson and Bull Run Peak, Tulare County; Barnes Mountain, Fresno County; Elizabeth Peak, Twain Hart, and near Groveland, Tuolumne County; along Omo Ranch Road, El Dorado County; Ralston Ridge, Placer County; Burney-Hat Creek area, Shasta County; and McCloud Flats, Siskiyou County.

At McCloud Flats, tree killing by beetles in the Edson Creek area appeared directly associated with the proliferation there of black staining root disease. Further west on the Flats, in the thinned stands at Pilgrim Creek and Elk Springs, the incidence of root disease was low, as was the number of beetle-killed trees.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi. Jeffrey pine beetles caused increased tree mortality near or at outbreak levels in four locations: Heitz Meadow - Pincushion Peak area, Fresno County; Antelope Reservoir, Plumas County; Honey Lake, Lassen County; Burney-Hat Creek area, Shasta County. Action to salvage the mortality and to remove infested trees was being considered or was in progress at each location.

FIR ENGRAVER BEETLE, Scolytus ventralis. Scattered top and whole-tree killing was observed throughout much of the host range. However,

at only one location -- Franklin Creek drainage in Modoc County -- was damage concentrated enough to make salvage a viable possibility.

PINE ENGRAVER BEETLES, Ips spp. No out-of-the-ordinary infestation or damage by pine engraver beetles was observed or reported in 1976. Of those that were reported, some could be traced directly to a disturbance such as logging or fire.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosa. The mountain pine beetle infestation in lodgepole pine at Skunk Cabbage Creek in the southern Warner Mountains of Modoc County continued into 1976, as did efforts to evaluate the significance of the outbreak.

At Parker Creek, also in Modoc County, an outbreak of mountain pine beetle caused tree killing in stands of pole-size ponderosa pine similar to that which occurred at Joseph Creek in the 1960's. Logging to salvage mortality and thinning operations to increase the resistance of the residual stands was initiated.

Elsewhere in the State, killing of scattered large sugar pine was observed, frequently on ridge-tops.

SAWFLY, Neodiprion spp. In 1975, sawfly defoliation of white fir was prevalent over much of the host type in the central Sierra Nevada. In 1976 only two small centers were reported in Placer County on the Tahoe National Forest; this compares with some 70 centers in 1975.

Reports of sawflies defoliating pine in California have seldom been noted, as such incidents have typically involved only a single tree or two in an isolated location. In 1976, however, colonies of sawflies were reported feeding on pine in six locations. In three of those locations -- Long Valley, Mendocino County, and Cedar Flat and Socker Creek, Siskiyou County -- feeding injury was prevalent, with 100, 1000, and 10,000 plantation pine trees affected at each location, respectively.

SCALE INSECTS. Reports of damaging infestations of scale insects were low. Two infestations of black pine-leaf scale, Nuculaspis californica, which were very active in 1975, collapsed this year; those infestations had been centered in the vicinity of Glenburn, Shasta County, and Surprise Valley, Modoc County.

BUDWORMS, Choristoneura spp. Larval sampling in June and egg mass sampling in September indicated that the infestations of Modoc budworm (Choristoneura viridis) on white fir in Modoc County had subsided to endemic levels. No detectable budworm defoliation is expected in 1977.

WHITE FIR NEEDLE MINER, Epinotia meritana. As reported in 1975, the white fir needle miner is one of several defoliating insects associated

with the Modoc budworm on white fir in Modoc County. Sampling in June 1976 indicated a continuing infestation of needle miners at Manzanita Mountain; further sampling in the spring of 1977 should tell if the population there will persist.

Needle miners defoliated white fir on some 2300 acres in Ice House Canyon, San Bernardino County. Sampling was planned for mid-winter 1977 to judge the likelihood of continued injury in this high-use recreation area.

INSECTS DAMAGING PLANTATIONS AND YOUNG TREES. Injury to plantation pine trees -- sometimes numbering in the thousands -- was reported from throughout the State. In most cases, the injury was caused by one or more of these insects: the pine needle sheath miner, Zelleria haimbachi; the pine resin midge, Cecidomyia piniiopis; and, the ponderosa pine tip moth, Rhyacionia zozana.

In a Forest Service administrative study outplanting site at Cherry Lake in Tuolumne County, the survival and growth rates of bare root and container-grown white fir seedlings were to have been compared. Such a comparison may not be possible, however, since cutworms and white grubs injured and killed many of the container-grown seedlings.

Douglas-fir gall midges, Contarinia spp., were active again in plantation Douglas-fir at several locations.

Nantucket pine tip moth, Rhyacionia frustrana, continued active within the known area of infestation in San Diego County. At Wasco in Kern County, a cooperative State-County-private landowner project was conducted to eradicate the tip moth from a 40-acre plantation. Treatment consisted of alternate applications of Bacillus thuringiensis and carbaryl at two-week intervals. Checks in mid-August and October revealed no surviving tip moths.

TABLE I

INSECT CONTROL ACTIONS RECOMMENDED - 1976

INFESTATION AREA	ACREAGE (EST.)	COUNTY	INSECT	HOST	RECOMMENDED ACTION
NORTHERN CALIFORNIA COMMERCIAL AND RECREATIONAL FORESTS					
BARK BEETLES					
Parker Creek	300	Modoc	Dm	PP	Thin**
Greenville-Milford	115,000	Plumas	Dj	JP	Evaluate**
McCloud Flats	7,000	Siskiyou	Db, (Vw)	PP	Thin, research, control**
Northwest California	200,000	Siskiyou	Md	DF	Evaluate, salvage
Warner Mountains	3,400	Modoc	Dm	LP	Evaluate
DEFOLIATORS					
Manzanita Mountain	8,000	Modoc	Em	WF	Evaluate
Ice House Canyon	2,300	San Bernardino	Em	WF	Evaluate**
Statewide	--	--	Gm	O	Surveillance
PLANTATIONS AND EXPERIMENTAL AREAS					
Established Seed Orchards	100	Northern California	Da, Rz, Zh	PP	Spray grafted trees 5 times
Plantations	--	Statewide	Rf, Cp, Gh	Hard pines	Surveillance, research
STATE AND NATIONAL PARKS					
Lassen Volcanic National Park	3,000	Shasta, Lassen	Dj, Db, Dm	JP, PP, SP, LP	Surveillance
Sequoia and Kings Canyon N. P.	2,500	Fresno, Tulare	Dj, Db, Dm	JP, PP, SP, LP	Maintenance Control*
Yosemite National Park	1,200	Mariposa, Tuolumne	Dj, Db, Dm	JP, PP, SP, LP	Maintenance Control*
Yosemite National Park	100,000	Tuolumne	Cm	LP	Surveillance, research
SOUTHERN CALIFORNIA RECREATION FORESTS					
Arrowhead-Crestline	47,000	San Bernardino	Dm, Db, Ips, Dj	PP, CP, JP	Sanitation, maint. control*
Arroyo-Seco District	3,000	Los Angeles	Db, Ips, Mc	PP, CP, JP	Surveillance
Big Bear Valley	8,800	San Bernardino	Dj, Ips, Mc, Sv	JP, WF	Sanitation, maint. control*
Idyllwild-San Jacinto	37,000	Riverside	Mc, Db, Ips, Dm	PP, CP, JP	Sanitation, maint. control*
Laguna Mountain	9,700	San Diego	Db, Mc	CP, JP	Maintenance Control*
Lost Valley	4,000	San Diego	Db, Ips	CP	Maintenance Control*
Mt. Baldy District	1,500	Los Angeles	Ips, Dj, Dm, Mc	PP, JP, CP	Surveillance
Mt. Pinos District	24,000	Ventura	Ma	Pe	Surveillance
Mt. Pinos District	7,900	Ventura, Kern	Mc, Ips	JP	Surveillance
Ranger Peak-Figueroa Mtn.	700	Santa Barbara	Db, Ips, Dv	PP, CP	Surveillance
San Gorgonio District	25,000	San Bernardino	Db, Dj, Ips	PP, JP, CP	Sanitation, maint. control*
Snow Valley-Big Bear-Santa Ana	3,000	San Bernardino	C sp.	JP	Evaluate, research**
Valyermo District	14,600	Los Angeles	Mc, Ips	JP	Surveillance
Wrightwood	2,000	San Bernardino	Mc, Ips	JP	Maintenance Control*

PEST ABBREVIATIONS

C sp. - Jeffrey pine needle miner	Dv - Red turpentine beetle	Md - Fir flatheaded borer
Cm - Lodgepole needle miner	Eu - Eucosma	Na - White fir sawfly
Cp - Pine resin midge	Em - White fir needle miner	Nc - Black pine leaf scale
Da - Fir coneworm	Gm - Gypsy moth	Rf - Nantucket pine tip moth
Db - Western pine beetle	Gh - Grasshoppers	Rz - Ponderosa pine tip moth
Dj - Jeffrey pine beetle	Ips - Pine ips	Sv - Fir engraver
Dm - Mountain pine beetle	Mc - California flatheaded borer	(Vw) - Black staining root disease
Dp - Douglas-fir beetle	Ma - Pinyon needle scale	Zh - Needle-sheath miner

HOST ABBREVIATIONS

CP - Coulter pine	Pe - Pinyon pine
DF - Douglas-fir	PP - Ponderosa pine
JP - Jeffrey pine	RF - Red fir
LP - Lodgepole pine	SP - Sugar pine
O - Oaks	WF - White fir

NOTES: *Maintenance Control is defined as suppression measures applied continually or annually (seasonally) in an effort to keep tree losses at a tolerable level. Suppression measures may include logging, wood cutting, felling and burning, or insecticide application on infested trees. Based on the Council's 1971 Resolution, it is recommended that chemicals be used only when non-insecticidal alternatives of suppression are not suitable.

**Table 1 was not approved by the Council in 1976. All entries remain the same as in 1975, except for those identified by the asterisks, which were added as recommendations by the Forest Service.

SURVEYS AND EVALUATIONS

ACCELERATED DOUGLAS-FIR MORTALITY. The Forest Service began an evaluation of the accelerated mortality of Douglas-fir on the Salmon River Ranger District in the Klamath National Forest, Siskiyou County. Field work was completed by fall, and a partial analysis of the data indicated that stand and site conditions (including talus slopes, advanced tree age, and hardwood competition), Douglas-fir bark beetle, fir flatheaded borer, dwarf mistletoe, and Polyporus schweinitzii root rot contributed to the losses.

OZONE INJURY TO PINES. The Forest Service collected data on ozone injury to ponderosa and Jeffrey pines on trend plots established in 1974 and 1975 on the Cleveland, Los Padres, and Sequoia National Forests (San Diego, Ventura, Kern, Fresno, and Tulare Counties). Mean tree ratings for each plot showed that injury continued to be very slight to slight, according to the injury-rating system developed in southern California. No significant worsening or improvement of the plot trees was observed. An additional 50-tree trend plot was installed at the University of California's Whitaker's Forest, near Kings Canyon National Park in Tulare County; ozone injury there is presently slight.

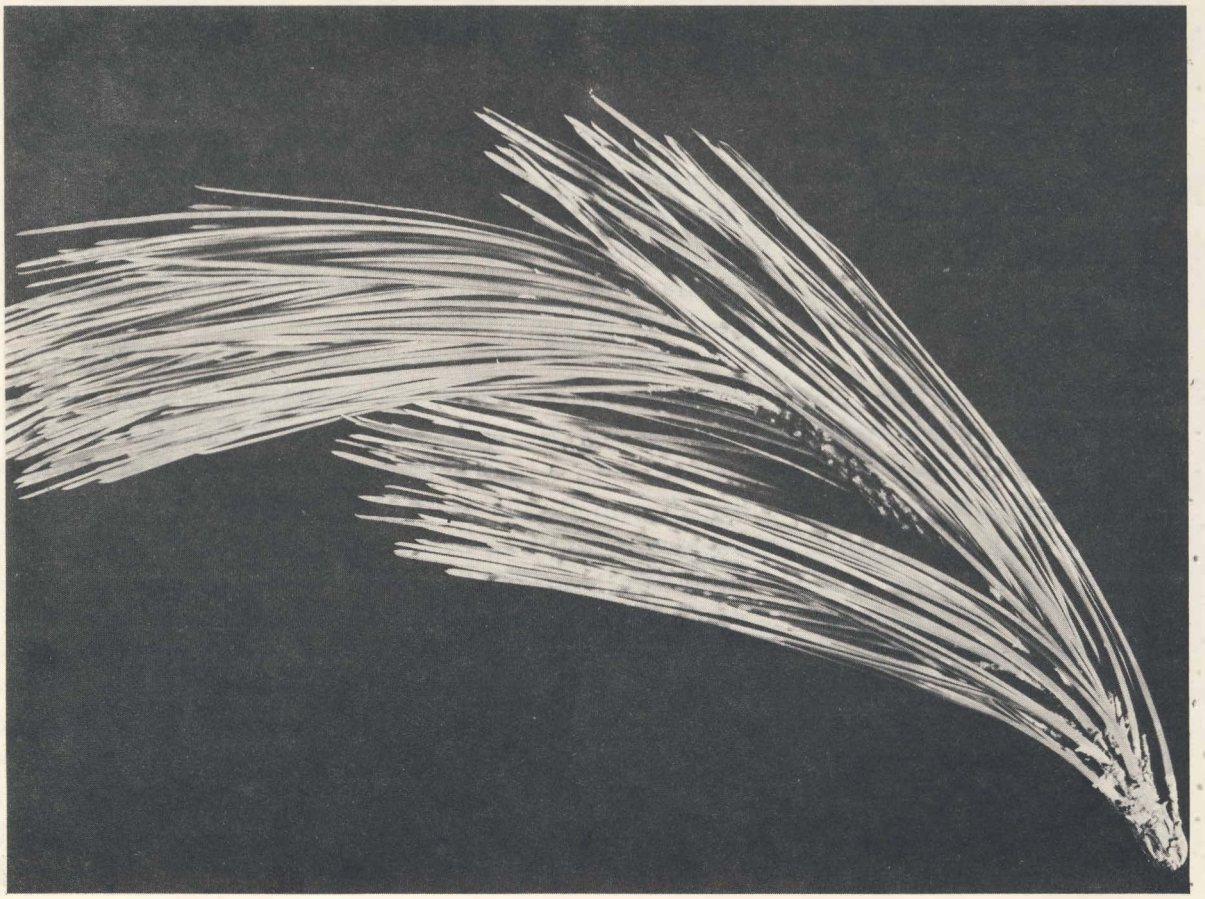
The Forest Service, with the assistance of the University of California and the State Air Resources Board, monitored ozone at Whitaker's Forest in 1976. From mid-July through October, during which 93 percent of the total hours were monitored, the ozone dose was 564 parts per hundred million - hours (pphm-hrs.) exceeding the Federal Standard (8 pphm), and 93 pphm-hrs. exceeding the California Standard (10 pphm). This dose was sufficient to produce the symptoms observed on pines in Fresno and Tulare Counties, although it was well below the dose experienced in the San Bernardino Mountains, where severe ozone damage has occurred for many years. (See also page 8.)

SAN BERNARDINO MOUNTAINS. The University of California and the Forest Service began an evaluation of the extent and cause of tree mortality in the recreation forests of the San Bernardino Mountains (San Bernardino County). Aerial photographs were made of 42 plots in the pine and mixed conifer forest type, and ground data were collected on 120 dead tree groups within these plots. The cooperative project will continue into 1977; estimates of pest damage will be used to formulate management guidelines for this recreational forest.

FOMES ANNOSUS IN WHITE FIR. The University of California and the Forest Service (including the PSW Station, the Region, and the Silvicultural Development Unit) began a survey of the incidence and extent of Fomes annosus-caused root infection and decay in young-growth white

fir stands. 120 pole-sized and young sawtimber-sized white fir on the Lassen National Forest (Shasta County) were uprooted with logging equipment, and the crowns, roots, and stems examined for evidence of the fungus. Additional field work is planned for 1977.

OZONE SYMPTOMS ON PLANTATION PONDEROSA PINE. Ozone injury is evident as a chlorotic mottle of the second year's needles of this 12-year-old sapling; the current year's needles showed no symptoms. This pine is located on the Hume Lake District of the Sequoia National Forest, some two miles west of the ozone monitor at Whitaker's Forest (Fresno County). Up to a fifth of the planted pines in this vicinity exhibited similar symptoms on second or third year's needles.



STATUS AND CONTROL OF DISEASES

WEATHER. Abnormally low precipitaion during the winter of 1975-76, combined with sporadic summer rainfall throughout the northern part of the State, resulted in an overall water deficit that produced an unusual number of weather-related detection reports. Most of these were diagnosed as drought-caused. The drought is expected to increase problems in the State for at least the next year, even if rainfall returns to normal in 1977.

NURSERY DISEASES. Major losses of 1-0 sugar pine occurred at both Humboldt and Placerville nurseries. 23 percent of the sugar pine planted in beds which were fumigated in the spring were killed by a complex of Fusarium and water molds (Pythium/Phytophthora); the complex caused a root rot of 3-4 month-old seedlings.

Forty-nine percent of the sugar pine and 16 percent of the Douglas-fir planted at Placerville Nursery, Camino Tract, were killed by a Rhizoctonia-Fusarium complex.

Strains of Botrytis cinerea resistant to benomyl continued to be a major problem in nurseries producing containerized stock. B. cinerea was found in two nurseries where the tolerant strain had not previously existed; one nursery sustained large losses.

Other disease incidence was low in 1976. Phoma sp. in 1-0 Douglas-fir, Phomopsis lokoyae in 2-0 Douglas-fir, and Sirrococcus strobilinus in Jeffrey pine were found in the Humboldt nursery, but caused little damage. At Placerville nursery, Phytophthora sp., a root rot, was found in two beds of 2-0 sugar pine, and charcoal root rot, caused by Macrophomina phaseoli resulted in minor losses in true fir.

AIR POLLUTION. Ozone injury symptoms were reported as common on ponderosa and Jeffrey pines along Highways 69, 180, and 198 from Pinehurst to near Big Baldy Ridge in Kings Canyon National Park, Fresno and Tulare Counties. At Big Stump Basin near the entrance to the Park, 33 out of 38 ponderosa pines examined had ozone-induced chlorotic mottle on 1974 or younger needles; symptoms were also observed on sugar pine and white fir. (For further information on ozone injury, see SURVEYS AND EVALUATIONS, page 6.)

STEM AND BRANCH CANKERS. Dermea pseudotsugae was reported from private, State, and Federal forest lands in Del Norte, Humboldt, and Siskiyou Counties. Once reported primarily as a disease of plantations, the canker is now widespread in natural stands, affecting Douglas-fir that range in size from saplings to younger sawtimber. The infection

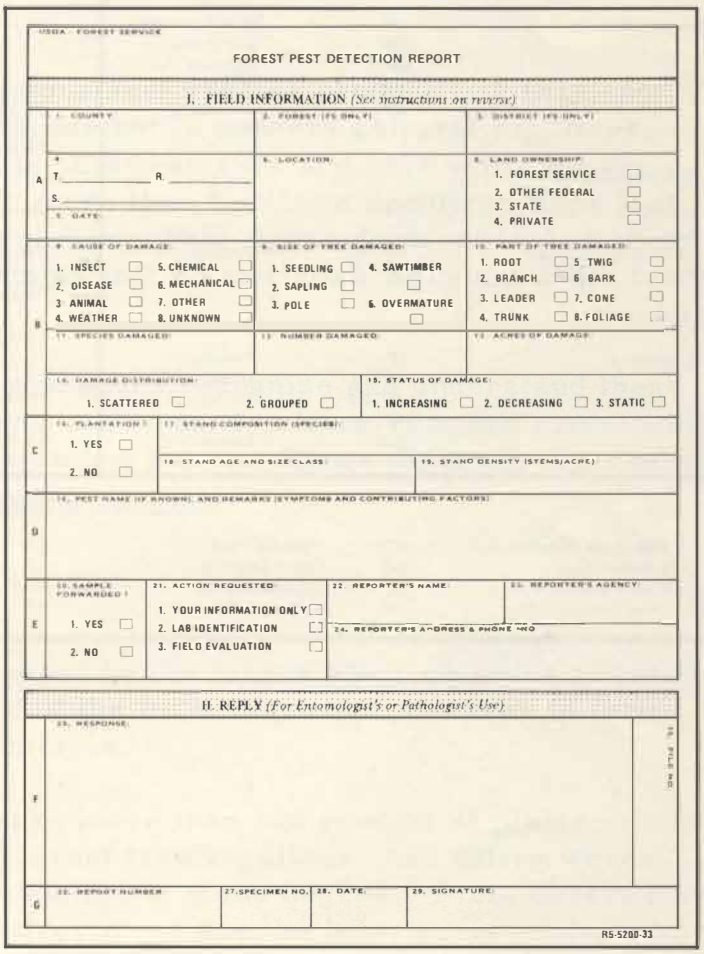
rate appeared to decrease in some of the plantations where it was first reported about five years ago.

FOLIAGE DISEASES. Infection by Lophodermella arcuata, a needle cast of sugar pine, was more widespread and severe in Plumas County than in 1975, and the needle cast may have contributed to the deaths of sugar pine in a plantation in Tuolumne County.

ROOT ROTS. Fomes annosus and Armillaria mellea were reported at a normal rate in 1976, but reports of mortality associated with Verticicladiella wagenerii increased markedly. The increase may have been associated with a greater awareness of the disease, or with drought conditions.

WHITE PINE BLISTER RUST. Blister rust was reported widely throughout the State. Large, new infection centers were observed in sugar pine outplanting sites in Siskiyou County, several new centers were reported in Tulare County, and infection of Ribes sp. was extremely heavy in the northern counties during the summer. Weather favorable to infection of pines could result in severe spread over the next few years.

FOREST PEST DETECTION REPORT. This Conditions Report is compiled from information recorded on this form by Federal, State, and private forest managers and individuals. The accuracy and completeness of the data reported here depends on the care with which people concerned with forests report incidents of damage caused by insects, diseases, animals, weather, chemicals, and air pollution. The form is available at local offices of the Forest Service, or from the California Department of Forestry.



USDA FOREST SERVICE

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION *(See instructions on reverse)*

A
1. COUNTY
2. FOREST (FS ONLY)
3. DISTRICT (FS ONLY)
4. T _____ R. _____ S. _____
5. DATE
6. LOCATION
7. LAND OWNERSHIP: 1. FOREST SERVICE ☐ 2. OTHER FEDERAL ☐ 3. STATE ☐ 4. PRIVATE ☐

B
8. CAUSE OF DAMAGE: 1. INSECT ☐ 5. CHEMICAL ☐ 2. DISEASE ☐ 6. MECHANICAL ☐ 3. ANIMAL ☐ 7. OTHER ☐ 4. WEATHER ☐ 8. UNKNOWN ☐
9. SIZE OF TREE DAMAGED: 1. SEEDLING ☐ 4. SAWTIMBER ☐ 2. SAPLING ☐ 3. POLE ☐ 5. OVERMATURE ☐
10. PART OF TREE DAMAGED: 1. ROOT ☐ 5. TWIG ☐ 2. BRANCH ☐ 6. BARK ☐ 3. LEADER ☐ 7. CONE ☐ 4. TRUNK ☐ 8. FOLIAGE ☐
11. SPECIES DAMAGED
12. NUMBER DAMAGED
13. ACRES OF DAMAGE
14. DAMAGE DISTRIBUTION: 1. SCATTERED ☐ 2. GROUPED ☐
15. STATUS OF DAMAGE: 1. INCREASING ☐ 2. DECREASING ☐ 3. STATIC ☐

C
16. PLANTATION? 1. YES ☐ 2. NO ☐
17. STAND COMPOSITION (SPECIES)
18. STAND AGE AND SIZE CLASS
19. STAND DENSITY (STEMS/ACRE)

D
20. PEST NAME (IF KNOWN), AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS)

E
21. SAMPLE FORWARDED? 1. YES ☐ 2. NO ☐
22. ACTION REQUESTED: 1. YOUR INFORMATION ONLY ☐ 2. LAB IDENTIFICATION ☐ 3. FIELD EVALUATION ☐
23. REPORTER'S NAME
24. REPORTER'S AGENCY
25. REPORTER'S ADDRESS & PHONE NO

II. REPLY *(For Entomologist's or Pathologist's Use)*

F
26. RESPONSE
FILE NO.

G
27. DEPOSIT NUMBER
28. SPECIMEN NO.
29. DATE
30. SIGNATURE

R5-5200-33

TABLE II

FOREST DISEASES REPORTED - 1976

CAUSAL AGENT	HOST	COUNTY
RUSTS		
White pine blister rust	SP	Humboldt
	SP	Siskiyou
	SP	Tulare (14)
Western gall rust	LP	El Dorado
Needle rust	WP	Placer
Stalactiform rust	JP	Los Angeles
	LP	El Dorado
MISTLETOES		
Dwarf Mistletoe	SP, WP, JP, KP	Humboldt
CANKER DISEASES		
Atropellis pinicola	SP	Trinity
Dermea pseudotsugae	DF	Humboldt (3)
	DF	Del Norte
	DF	Plumas
	DF	Siskiyou (2)
	DF	Trinity (2)
FOLIAGE DISEASES		
Elytroderma deformans	PP	Trinity
Lophodermella arcuata	SP, WP	Plumas
ROOT DISEASES		
Fomes annosus	IC	Fresno
	JP	Lassen (2)
	JP, RF	Tuolumne
	SP	Lake
	WF	Lassen (5)
Verticicladiella wagenerii	DF	Humboldt (2)
	DF	Lake
	DF	Shasta (2)
	JP	Lassen
	PP	Siskiyou
Armillaria mellea	SP, PP	Lake
Polyporus schweinitzii	DF	Shasta
	DF	Siskiyou
ABIOTIC DISEASES		
Ozone	JP, PP	Fresno
Salt	IC	El Dorado
	PP	Siskiyou
Weather	DF, WF, PP	Mendocino
	DF, WF, PP	Plumas
	DF, WF, PP	Siskiyou
	DF, LP	Del Norte
	IC	Los Angeles
	JP	Tuolumne
	SP, IC	Calaveras
NURSERY DISEASES		
Botrytis cinerea	CR, DF	Humboldt
	DF	Mendocino
Macrophomina phaseoli	DF, RF, WF	Placer
Phoma sp.	DF	Humboldt
Phytophthora sp.	SP	Placer
Pythium/Phytophthora-Fusarium	DF, SP	Placer
	SP	Humboldt
Sirrococcus strobilinus	JP, PP	Humboldt
Weather (heat)	DF	Monterey

HOST ABBREVIATIONS

BDF	Big-cone Douglas-fir	FP	Foxtail Pine	KP	Knobcone Pine	RF	Red fir
CP	Coulter pine	GS	Giant Sequoia	LP	Lodgepole Pine	SP	Sugar pine
CR	Coast redwood	IC	Incense-cedar	Mad	Madrone	WF	White fir
DF	Douglas-fir	JP	Jeffrey pine	PP	Ponderosa pine	WP	Western white pine

KNOW YOUR FOREST DISEASES

NURSERY DISEASES

In recent years there has been an increased demand for regenerating forest land by planting. This demand has increased for many reasons. Among these are, (1) the need to replant the backlog of lands that have not been regenerated successfully by other methods; (2) natural regeneration is not always reliable in intensive management circumstances; (3) planting allows land managers to maintain adequate stocking levels and provides for better utilization of sites; (4) planting allows for introduction of improved trees; and (5) the California State Legislature requires specific levels of stocking on cutover lands within a limited time.

To meet the increased demand for seedlings from forest land managers -- as well as from specialists such as Christmas tree growers -- Federal and State agencies, the forestry industry, and private individuals have increased their production capacity and developed new nurseries. This has resulted in an increase of 11 million seedlings shipped per year from 1971 to 1976.

While increasing capacity is important, greater productivity may also be gained by emphasizing improvement in nursery cultural practices, especially concerning diseases. Between 1971 and 1976 while all the development was taking place, more than 6 million seedlings were lost to diseases in the Federal nurseries. This figure does not include seedlings lost during transit or outplanting; no statistics were available from State or private nurseries.

To help nurserymen and land managers recognize and understand these disease problems, the three major diseases in bare-root and containerized nurseries in California are described below. These diseases are charcoal root disease, Phoma blight, and grey mold.

CHARCOAL ROOT DISEASE

The charcoal root disease, caused by the fungus Macrophomina phaseoli (Sclerotium bataticola), is one of the most important diseases in forest nurseries in western North America.

THE HOST. M. phaseoli attacks more than 300 species of plants, including many agricultural plants, forest tree seedlings, and native weeds. All conifers are probably susceptible to some degree. Field observations suggest that ponderosa and Jeffrey pines are the least susceptible, while

sugar and Monterey pines, Douglas-fir, red and white fir, and giant sequoia are the most susceptible.

LIFE HISTORY. The fungus invades the root tips, lateral roots, and root crown, and destroys the cortex, phloem, and cambium. The gradual destruction of the root system causes the seedlings to become stunted and chlorotic, and finally to die.

Nursery managers usually feel the impact of losses in three ways: (a) seedling mortality in the nursery; (b) increased numbers of cull (stunted) seedlings; and (c) increased losses of outplanted seedlings due to damaged root systems.

The fungus overwinters, or lies dormant, in the soil in the form of sclerotia -- small, black, spherical resting structures. It does not grow or develop in the soil in the absence of a host plant. When the growing root of a susceptible plant comes in contact with a sclerotium, it is stimulated by the root to germinate. The fungus grows over the root surface and penetrates between the epidermal cells into the root cortex. In the cortex the fungus grows through the root toward the root crown, destroying the cortex, phloem, and cambium as it proceeds. The fungus continues to develop within these dead tissues, forming masses of new dormant sclerotia both in the cortex and between the xylem elements.

These sclerotia can be seen easily in the roots through a hand lens, and hence are helpful in diagnosis. As other saprophytic microbes decay the remains of the infected roots, and as soil movements break up rotten roots, the new sclerotia are liberated into and distributed within the soil to await the next crop of seedlings. These sclerotia may remain dormant for many years awaiting a suitable host.

Temperature plays a critical part in this disease. The fungus requires rather warm soils (15°-18° C) before it can become damaging. In California nurseries, this disease does not occur until midsummer.

Depending on environmental conditions of the outplanting site, the fungus may or may not continue to threaten the transplanted seedlings. In an infested nursery, many seedlings become mildly infected and never show any symptoms. When outplanted, these seedlings carry the disease with them. The fungus ceases to develop and gradually dies in seedlings planted in cool forested sites. In warm soils, the fungus continues to develop and may kill the transplant. Infected transplants which are placed under strees, such as a lack of moisture, are most susceptible.

CONTROL. Most cultural control measures are not effective against this pathogen. The ability of the sclerotia to survive many years in the soil and their wide host range limit effectiveness of fallow periods and

cover crops as control measures. In some areas where soil temperatures are marginal for disease development, seedlings mortality may be reduced by shading, but the general level of seedling infection is not usually reduced markedly.

The most successful control measures to date are pre-plant soil fumigations with broad-spectrum biocides, such as methyl bromide or mixtures of methyl bromide and chloropicrin. Soil fumigation either in the spring or early fall before planting is effective in controlling this disease. Both pre- and post-planting applications of several fungicides have been tested, but none has done an adequate job.

GREY MOLD

Grey mold -- a disease of many plants, including forest tree seedlings -- is caused by the fungus Botrytis cinerea; its perfect stage is Sclerotinia fuckeliana (deBy) Fckl.. This fungus, also a saprophyte, is almost universally present on dead and dying vegetable matter. As a plant pathogen, the fungus usually must first become established on dead or moribund parts of a host plant. It then can spread into adjacent healthy tissues. A few species of conifers, particularly giant sequoia, are so susceptible to B. cinerea that the fungus can successfully infect healthy green tissues.

HOSTS AND DAMAGE. This pathogen has an extremely large host range. Nearly all forest trees are susceptible to some degree, but it is a serious problem only on a few species such as redwood, giant sequoia, and Monterey and Italian cypress; also, Douglas-fir when it is grown in a containerized nursery.

The disease causes a branch dieback and canker of green succulent tissues. In 1-year seedlings, stem cankers originating from infected lower branches frequently girdle the stem and kill the entire seedling. In California, when conditions are suitable, whole sections of nursery beds of giant sequoia have been destroyed.

LIFE HISTORY. Under prolonged periods of high humidity and cool temperatures, this fungus infects the juvenile bracts and young branches, particularly the lower shaded branches. Once established, it proceeds downward into the stem, killing the tissues it infects. In the succulent 1-year-old stem tissues, it forms a black sunken canker which eventually girdles the stem. The portion of the seedling distal to the girdle dies. Since the lower shaded branches are infected more often than the upper branches, the girdles are usually low on the stem in a position where most, or all, of the crown is killed. This disease is favored by cultural practices such as high planting densities or lath shading, which limit air movement and raise the humidity around the seedling.

Under moist conditions, B. cinerea can be seen as a thin grey web of mycelium on infected plant parts. From this mycelium and from infected tissue, tufts of black conidiophores arise bearing clusters of white to grey spores. When the conidiophores are brushed, clouds of spores are released.

CONTROL. Proper cultural practices which increase aeration and decrease humidity will help reduce or prevent losses in most species. In highly susceptible species, fungicidal sprays may be required. Most fungicides act as protectants; they do not cure the disease once it is in the plant. Therefore, fungicides must be applied at the first sign of the disease, and their use continued as long as conditions favorable to the disease persist.

One of the fungicides used to protect seedlings from B. cinerea has been benomyl, commonly sold as Benlate (R). However, recently Dr. Arthur McCain, plant pathologist at the University of California, Berkeley, has discovered that there are strains of the fungus that have developed a tolerance for this fungicide. Therefore, when fungicides are going to be applied, it would be better to use a number of fungicides, perhaps three or four, applied alternately at specific intervals rather than to depend on a single fungicide. This procedure may reduce the chances of a strain that is tolerant to a specific chemical, causing extensive damage.

PHOMA BLIGHT

In 1971 and 1975 there were major losses of 1-0 Douglas-fir at the Humboldt nursery in McKinleyville, California. The fungus most commonly isolated from the needles and stems of these declining trees has been a Phoma species. Although pathogenicity tests have not yet been conducted at this time, evidence suggests that Phoma sp. is the probable cause of the disease.

HOST AND DAMAGE. The Phoma sp. has only been found killing Douglas-fir at the Humboldt nursery. In the winter and early spring it causes a blight on the foliage of the smaller 1-0 Douglas-fir seedlings, sometimes totally destroying the foliage and buds of these seedlings.

LIFE HISTORY. The following is a supposition based on field observations. At Humboldt nursery, the Douglas-fir grow 1 to 4 inches the first growing season. During the winter and early spring, rain splashing and irrigation cause a build-up of soil around the stem and into the lower crown of the smaller seedlings. Phoma, which is assumed to be a soil resident, like many other Phoma spp., grows out of the soil, initially infecting the cotyledons. It then spreads up the crown of the seedling

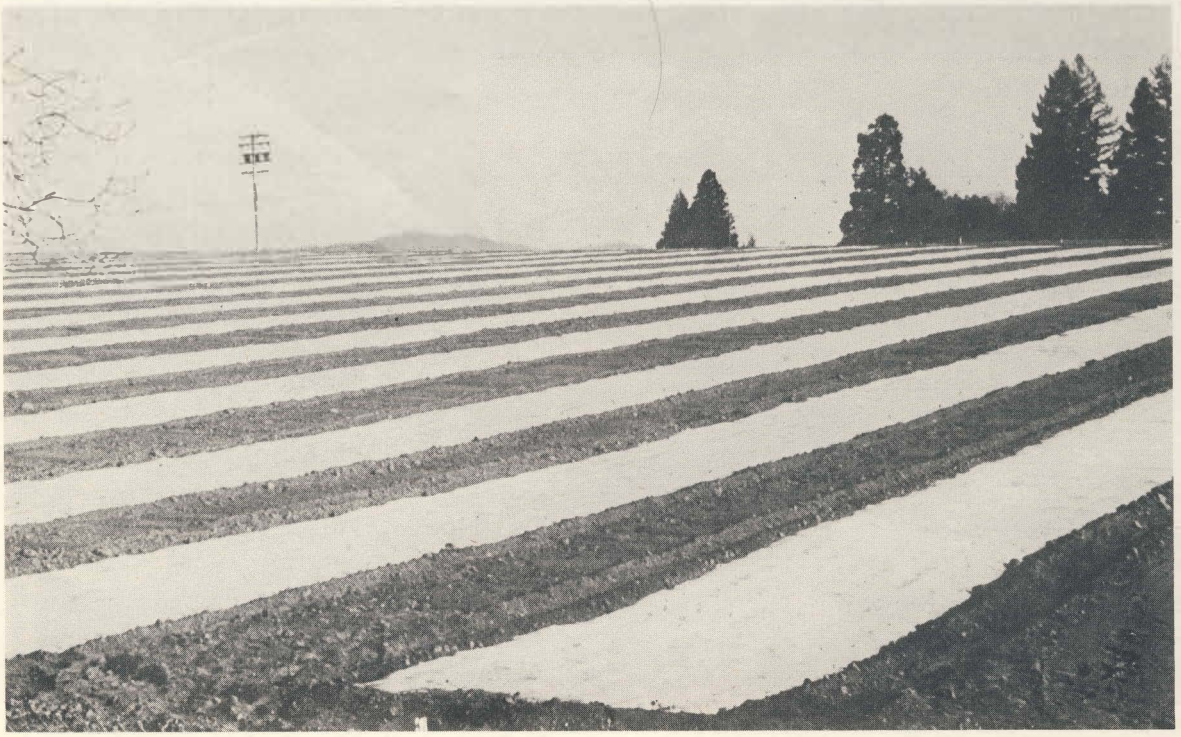
and kills the needles, which then fall to the ground until the seedling is defoliated. Frequently the disease also affects the new buds.

The initial symptoms are a chlorosis of the needles. These infected needles then turn a golden brown. After an undetermined period of time, the fungus will form fruiting bodies that look like black raised spots on the dead needles.

CONTROL. The only known and registered control for this disease is chlorothalonil, sold as Bravo 6F (R). If cultural methods can be developed to inoculate the seedling beds with mycorrhizal fungi after fumigation, the seedlings will grow tall enough to withstand the effects of infection by Phoma sp. in the lower needles.

(NOTE: The descriptions of charcoal root disease and grey mold were taken from "Forest Nursery Diseases in the United States," Agricultural Handbook No. 470, United States Department of Agriculture, Forest Service.)

NURSERY SOIL FUMIGATION. To protect young seedlings from damping-off fungi and from root rots such as Macrophomina phaseoli, planting beds are injected with soil fumigants and covered with plastic tarps. The tarps are lifted after 24 hours, and the fumigant allowed to dissipate for 2-3 weeks before the beds are seeded. This photo was taken at the Forest Service's Placerville Nursery in Placer County.



STATUS AND CONTROL OF ANIMAL PESTS

POCKET GOPHERS. Pocket gophers were a major problem in coniferous plantations in most of the timbered areas of the State, except in the north coastal region. Damage occurred on ponderosa, Jeffrey, and Monterey pines, and on Douglas-fir and red fir. Damage was static at a high level in most areas. Baiting with strychnine-treated oats was the control method commonly employed.

PORCUPINES. Porcupine damage was greatest to ponderosa and Jeffrey pines in the four northeastern counties. Damage to pines and to white firs extended southward in the Sierra Nevada to Calaveras County. The extent of damage was static in most areas, but increased in some parts of Siskiyou, Lassen, and Shasta Counties. Increased damage also occurred on pine, Douglas-fir, and redwood saplings in Del Norte and Humboldt Counties. Limited control of porcupines with strychnine salt blocks and shooting was employed, principally in Siskiyou and Humboldt Counties.

DEER. Deer browsing of all species of commercial conifers occurred in all the major timber-producing areas of the State. Damage was static, except in Lassen and Shasta Counties, where it increased in young plantations of ponderosa pine, and in Mendocino County, where damage increased in young plantations of redwood and Douglas-fir. Hunting, fencing, and repellents were employed as controls in a few localities.

MINOR PESTS. The animals listed here caused damage in the counties noted. Damage was severe in some areas, but it was generally not widespread.

SPECIES	COUNTY
Birds	Del Norte, Humboldt, Siskiyou
Beaver	Del Norte, Humboldt, Siskiyou
Black Bear	Del Norte, Humboldt
Dusky-footed Wood Rat	Del Norte, Humboldt
Elk	Del Norte, Humboldt
Meadow Mouse	Del Norte, Humboldt, Siskiyou, Napa, Yolo, Solano, Colusa, Amador, Calaveras, El Dorado
Mountain Beaver	Del Norte, Humboldt

MINOR PESTS (List continued from previous page).

SPECIES	COUNTY
Rabbits	Del Norte, Humboldt, Marin, Mendocino, Sonoma, Napa, Yolo, Solano, Colusa
Small Seed-Eating Mammals	Del Norte, Humboldt, Siskiyou
Tree Squirrels	Del Norte, Humboldt, Shasta, Marin, Sonoma

POCKET GOPHER, Thomomys mazama. The Mazama pocket gopher is shown just after clipping a plantation pine seedling. Pocket gophers are the most destructive animal pests to forest regeneration in plantations in northern California. (Photo courtesy of the Forestry Research Center, Weyerhauser Corporation.)

RESOLUTIONS OF THE COUNCIL

The following Resolutions were adopted by the Pest Action Council at its annual meeting in Sacramento on November 9, 1976. The full texts of the Resolutions may be obtained by contacting any Council Officer.

RESOLUTION NO. 1. To the Regional Forester, Forest Service Region Five, and to the Chairman, California State Board of Forestry, commending them on their aggressive action in the harvest of dead and dying trees, while leaving appropriate numbers of snags for wildlife habitat.

RESOLUTION NO. 2. To the Membership, California Forest Pest Control Action Council, urging them to be aware of and to report possible effects of herbicides on arthropods.

RESOLUTION NO. 3. To the Regional Forester, Forest Service Region Five, urging him to provide adequate funding through calendar year 1977 for the Administrative Study in gopher damage assessment and population dynamics which is being conducted on the Eldorado National Forest.

RESOLUTION NO. 4. To the California State Board of Forestry, urging it to institute a program of research in animal damage, with the intent of finding practical solutions to controlling animal damage, so that timberland owners can comply with the stocking standards specified in the California Forest Practice Rules.

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Control Action Council. Detection of damage due to insects, diseases, animals, weather, chemicals, and air pollution should be reported on the Forest Pest Detection Report, form R5-5200-33, or by card or letter. The Pest Action Council encourages Federal, State, and private land managers and individuals to contribute to the Detection Survey by submitting damage reports and samples in the following manner.

Forest Service Personnel: Send detection reports through channels and mail all samples to the Regional Office -- USDA, Forest Service, Forest Insect and Disease Management Staff, 630 Sansome Street, San Francisco, California 94111.

State Personnel: Send all detection reports through channels; submit insect reports and damage samples to the CDF Headquarters -- California Department of Forestry, 1416 - 9th Street, Sacramento, California 95814 -- and mail all other reports and samples to the Forest Service Regional Office.

Private Foresters and Individuals: Send insect detection reports and damage samples to the CDF Headquarters -- California Department of Forestry, 1416 - 9th Street, Sacramento, California 95814 -- and send all other reports and samples to the Forest Service Regional Office.

Please submit adequate damage samples with each detection report; send several samples illustrating the stages of damage and decline. Keep samples cool and ship them immediately after collection. Send samples in a screw-top mailing tube or other suitable container, and enclose the original or a copy of the detection report with the sample.

All detection reports will be acknowledged and evaluated by specialists concerned with damage caused by forest pests.

Additional copies of the Forest Pest Detection Report form are available from local offices of the Forest Service and the California Department of Forestry.

YOUR COOPERATION WITH THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL IN ASSISTING WITH THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED.